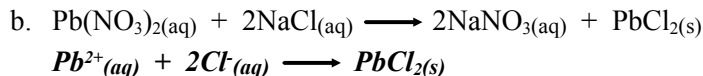
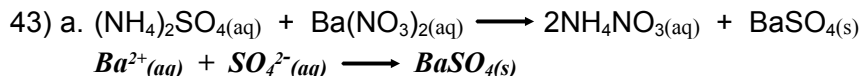
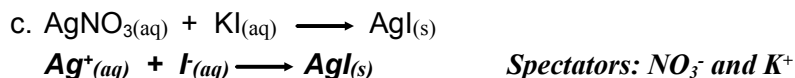
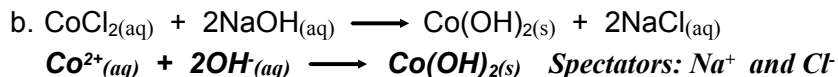
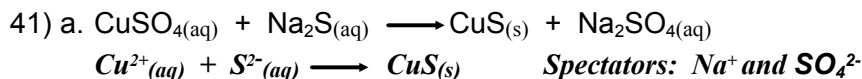
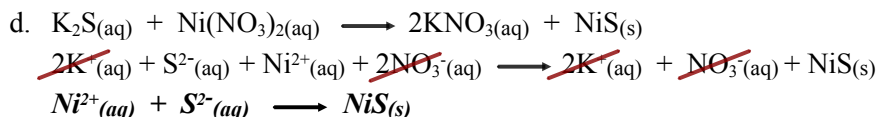
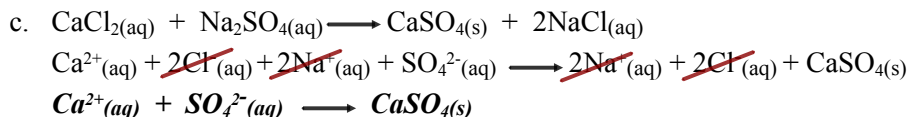
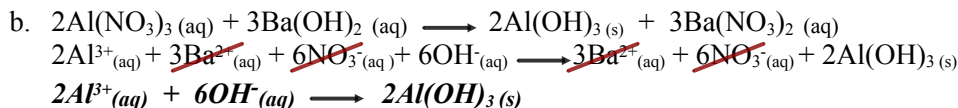


Questions 35 – 53 odd, 81, 83, 86

- 35) a. **aluminum nitrate - soluble** b. **magnesium chloride - soluble**
 c. **rubidium sulfate - soluble** d. nickel (II) hydroxide - insoluble
 e. lead (II) sulfide - insoluble f. magnesium hydroxide - insoluble
 g. iron (III) phosphate - insoluble

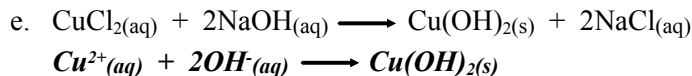
- 37) a. No precipitate b. Al(OH)_3 (s)
 c. CaSO_4 (s) d. NiS (s)

- 39) a. No reaction

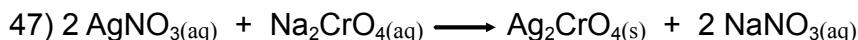


c. Both possible products are soluble (no reaction occurs)

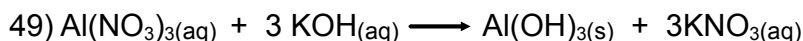
d. Both possible products are soluble (no reaction occurs)



45) Skip (Detailed knowledge of solubility rules is no longer required in AP Chemistry.

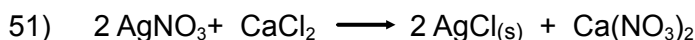


$$\frac{0.0750 \text{ L}}{1 \text{ L}} \times \frac{0.100 \text{ mol AgNO}_3}{1 \text{ L}} \times \frac{1 \text{ mol Na}_2\text{CrO}_4}{2 \text{ mol AgNO}_3} \times \frac{161.98 \text{ g Na}_2\text{CrO}_4}{1 \text{ mol Na}_2\text{CrO}_4} = \mathbf{0.607 \text{ g Na}_2\text{CrO}_4}$$



$$\frac{0.050 \text{ L}}{1 \text{ L}} \times \frac{0.200 \text{ mol Al}(\text{NO}_3)_3}{1 \text{ L}} \times \frac{1 \text{ mol Al}(\text{OH})_3}{1 \text{ mol Al}(\text{NO}_3)_3} \times \frac{78.00 \text{ g Al}(\text{OH})_3}{1 \text{ mol Al}(\text{OH})_3} = \mathbf{0.780 \text{ g Al}(\text{OH})_3}$$

$$\frac{0.200 \text{ L}}{1 \text{ L}} \times \frac{0.100 \text{ mol KOH}}{1 \text{ L}} \times \frac{1 \text{ mol Al}(\text{OH})_3}{3 \text{ mol KOH}} \times \frac{78.00 \text{ g Al}(\text{OH})_3}{1 \text{ mol Al}(\text{OH})_3} = \mathbf{0.520 \text{ g Al}(\text{OH})_3}$$



$$\frac{0.100 \text{ L}}{1 \text{ L}} \times \frac{0.20 \text{ mol AgNO}_3}{1 \text{ L}} \times \frac{2 \text{ mol AgCl}}{2 \text{ mol AgNO}_3} = \mathbf{0.02 \text{ mol AgCl}}$$

limiting

$$\frac{0.100 \text{ L}}{1 \text{ L}} \times \frac{0.15 \text{ mol CaCl}_2}{1 \text{ L}} \times \frac{2 \text{ mol AgCl}}{1 \text{ mol CaCl}_2} = 0.03 \text{ mol AgCl}$$

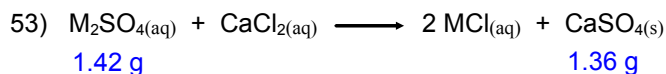
excess

	2Ag^+	2NO_3^-	Ca^{2+}	2Cl^-	\longrightarrow	$2 \text{AgCl}_{(\text{s})}$	$\text{Ca}^{2+}_{(\text{aq})}$	$2 \text{NO}_3^-_{(\text{aq})}$
I	0.02	0.02	0.015	0.03		0	0	0
C	-0.02			-0.02		+0.02		
F	0	0.02	0.015	0.01		0.02		

$$\frac{0.020 \text{ mol NO}_3^-}{0.200 \text{ L}} = 0.10 \text{ M NO}_3^-$$

$$\frac{0.015 \text{ mol Ca}^{2+}}{0.200 \text{ L}} = 0.075 \text{ M Ca}^{2+}$$

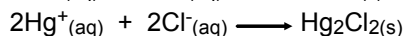
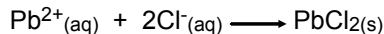
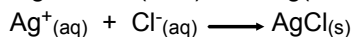
$$\frac{0.010 \text{ mol Cl}^-}{0.200 \text{ L}} = 0.050 \text{ M Cl}^-$$



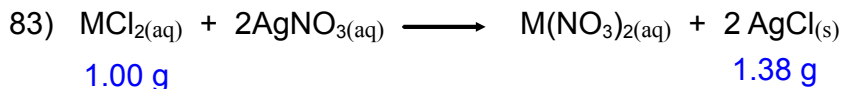
$$\frac{1.36 \text{ g CaSO}_4 \left| \begin{array}{c} 1 \text{ mol CaSO}_4 \\ 136.14 \text{ g CaSO}_4 \end{array} \right| 1 \text{ mol M}_2\text{SO}_4 \left| \begin{array}{c} ??? \text{ g M}_2\text{SO}_4 \\ 1 \text{ mol M}_2\text{SO}_4 \end{array} \right|}{1} = 1.42 \text{ g M}_2\text{SO}_4$$

$$\begin{aligned} \text{formula mass of M}_2\text{SO}_4 &= 142.15 \text{ g/mol} \\ &\quad - 96.06 \text{ g/mol} \\ &\quad \hline &46.09 \text{ g/mol} / 2 = 23.0 \text{ g/mol} = \text{Sodium} \end{aligned}$$

81) a. AgNO_3 , $\text{Pb}(\text{NO}_3)_2$ and $\text{Hg}(\text{NO}_3)_2$ would all produce precipitates with Cl^-

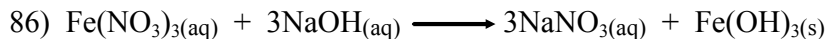


- b. Any soluble sulfate, sulfide, carbonate, chromate, or phosphate would produce precipitates with Ca^{2+}
- c. Any soluble hydroxide, sulfide, carbonate, chromate or phosphate
- d. Any soluble compound with Ba, Pb, Hg, or Ca
- e. Any chloride, bromide, iodide, sulfate, hydroxide, sulfide, carbonate, chromate or phosphate
- f. Any chloride, bromide, iodide, hydroxide, sulfide, carbonate, chromate or phosphate.



$$\frac{1.38 \text{ g AgCl} \left| \begin{array}{c} 1 \text{ mol AgCl} \\ 143.35 \text{ g AgCl} \end{array} \right| 1 \text{ mol MCl}_2 \left| \begin{array}{c} ??? \text{ g MCl}_2 \\ 2 \text{ mol AgCl} \end{array} \right|}{1} = 1.00 \text{ g MCl}_2$$

$$\begin{aligned} \text{formula mass of MCl}_2 &= 207.75 \text{ g/mol} \\ &\quad - 70.90 \text{ g/mol Cl}_2 \\ &\quad \hline &136.85 \text{ g/mol} = \text{Barium} \end{aligned}$$



$$\frac{0.107 \text{ g Fe}(\text{OH})_3 \left| \begin{array}{c} 55.85 \text{ g Fe} \\ 106.87 \text{ g Fe}(\text{OH})_3 \end{array} \right| 0.0559 \text{ g Fe} \left| \begin{array}{c} 241.88 \text{ g Fe}(\text{NO}_3)_3 \\ 55.85 \text{ g Fe} \end{array} \right|}{1} = 0.242 \text{ g Fe}(\text{NO}_3)_3$$

$$\frac{0.242 \text{ g Fe}(\text{NO}_3)_3}{0.456 \text{ g mixture}} \times 100 = 53.1\%$$